"AN INSPECTIVE INTERPRETATION OF CARDIORESPIRATORY ENDURANCE AMONG SMOKERS AND NON-SMOKERS IN COLLEGE LEVEL SPORTSMEN"

A Dissertation Submitted to

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY
CHENNAI

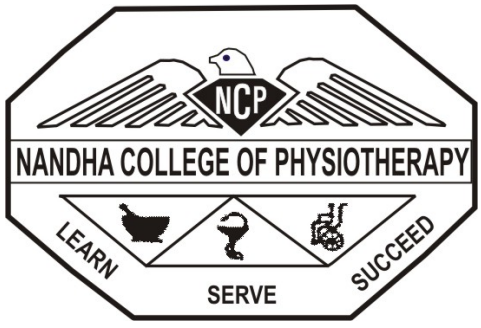
in partial fulfillment of the requirements
for the award of the

MASTER OF PHYSIOTHERAPY

(*ADVANCED PHYSIOTHERAPY IN SPORTSMEDICINE*)

Submitted by

Reg. No. 27102010



COLLEGE OF PHYSIOTHERAPY
NANDHA COLLEGE OF PARAMEDICAL SCIENCE
ERODE – 638 052
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THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY

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Under the guidance of

Prof. R.MANIKANDAN, ***M.P.T (Sports)., M.I.A.P.,***

A Dissertation Submitted to

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CHENNAI

Dissertation evaluated on _____

Internal Examiner External Examiner

CERTIFICATE

BY THE HEAD OF THE INSTITUION

This is to certify that the dissertation entitled ***"AN INSPECTIVE INTERPRETATION OF CARDIORESPIRATORY ENDURANCE AMONG SMOKERS AND NON-SMOKERS IN COLLEGE LEVEL SPORTSMEN"*** is a bonafide compiled work, carried out by **Reg. No. 27102010,** Nandha College of Physiotherapy ,Erode – 638 052 in partial fulfillment for the award of degree in Master of Physiotherapy as per the doctrines of requirements for the degree of **THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY Chennai-32.** This work was guided and supervised by **Asst. Prof. R.MANIKANDAN,** ***M.P.T (Sports)., M.I.A.P.,***

PRINCIPAL:
Prof.V.MANIVANNAN,*MPT(Ortho),*
NANDHACOLLEGE OF PHYSIOTHERAPY,
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CERTIFICATE

BY THE GUIDE

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Dedicated to almighty

My Beloved parents

Near & Dear Ones

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I dedicate this research work and its outcome to all the above listed and unlisted well wishers of me.

TABLE OF CONTENTS

CHAPTER I

INTRODUCTION

Sports holds predominant place in modern life. The Impact of sports on modern society has made it clear that sports are a very legitimate field of academic study.

Sports participation and appreciation have become integral part of the life.

Pluto the great Greek philosopher wrote “Lack of activity destroys the good condition of every human being while movement and methodical exercise save and preserve it”.

Sports by their very nature are challenging and enjoyable.

It is well known that only the strong will thrive, the weak will perish and only fit survive. he very basic for promoting physical fitness and health of a sports man depends on the habitual behavior of particular sports man .

“A healthy and fit person is an asset to the humanity while an unfit individual is a curse on himself as well as the society”.

Very few smokers know or will acknowledge the fact that, on average their life span is shortened by five and a half minutes for each cigarette smoked approximately as the cigarette lasts. It has been proved that smoking has a deleterious effect on health and that it has become the most prevalent form of drug dependence.

The physiological changes that affect the health occur in human body as a consequence of smoking.

1.1 RISKS OF SMOKING

There is now a great body of evidence to support the statement that death rates are higher among smokers than non-smokers. The danger of early death is greater for smokers and it is greater in the years between 45 and 54 than at any other age.

Other contributory or secondary factors are the amount smoked, the habit of inhaling, and the age at which smoking began.

Some studies have shown a higher rate of excess deaths amongst smokers of plain rather than filtered cigarettes.

Cigarettes of high tar and nicotine contents have been proved to be more dangerous than low tar and nicotine ones. Smokers of low tar and nicotine cigarettes are still more liable to early death than non-smokers. Former cigarette smokers experience an improvement in overall mortality ratio.

1.2 BENEFITS OF QUITING SMOKING

Within one to two days, carbon-monoxide and nicotine will be cleared from the body. After one month, blood pressure returns to normal and lungs are able to clean themselves and blood flow improves.

1.3 INFLUENCE OF SMOKING IN SPORTS PERFORMANCE

Smoking is a health hazard. Just about everyone agrees to that. But, because it appears to take years or even decades to catch up to them, sometimes young people feel that they can go ahead and smoke now and not worry about it. However, they do not consider the short term effects of smoking which can hinder sports performance or reduce endurance for people who lead an active life, even if they are not athletes.

Studies have shown that smoking increases airway resistance which means the energy and oxygen cost of breathing increases, as three fold, leaving les oxygen to be used for other activities. This seems to be combined effect of particulars in the smoke and nicotine working on the nervous system. Yet another problem arises from a third component of smoke and that component is carbon-monoxide.

Inhaled carbon-monoxide travels through the blood streams attached to hemoglobin, the same as oxygen. The problem is the carbon-monoxide gets there first, blocking out the oxygen, so there is less oxygen delivered to the working muscles.

Thus, the over all effect is that the smoker has less oxygen available for metabolism than would be available if he or she did not smoke. Fatigue sets in endurance are lessened and performance suffers.

1.4 STATEMENT OF THE PROBLEM

The purpose of the study is to compare the cardio-respiratory endurance among smokers and non-smokers in collage level sports-men.

1.5 HYPOTHESIS

In light of the preceding discussion and for the purpose of the present investigation, it is hypothesized that there would not be a significant decrease on cardio-respiratory endurance in smokers when compared with non-smokers among college level sports-men.

1.6 SIGNIFICANCE OF THE STUDY

In light of the above, the present study may provide some significant contributions in the following aspects:

- The results of this study will help the players to know their cardio-respiratory endurance level.

- The results of the study will give an idea to the smokers in sports about their reduced performance due to smoking.

- The results may help the players to prevent them from their early retirement of their sporting activities

- It would give guidance to the sports physiotherapist to care about the cardio-respiratory endurance of sports-men.

1.7 DELIMITATIONS

- The study was delimited to forty players including only foot ball, hockey, cricket, basket ball and volley ball who are studying in various colleges and among forty players, twenty smokers and twenty non-smokers were selected for this study.

- The age of the subjects was between 18-24 years.

- No special training and motivational techniques were used to increase the subject's performance.

- Among the physical fitness variables, cardio-respiratory endurance was selected as criterion variable.

1.8 LIMITATIONS

- The effect of following environmental factors such as climatic conditions, humidity was not considered.

- Nutritional habits of the subjects, rest, practice etc, were not taken into consideration.

- Regular activity pertaining to their day to day routine was not taken into consideration.

1.9 DEFINITION OF THE TERMS

1.9.1 CARDIO-RESPIRATORY ENDURANCE

The efficiency with which the body delivers oxygen and nutrients needed for muscular activity and transports waste products from the cells.

1.9.2 SMOKER

A person who smokes tobacco regularly.

1.9.3 PHYSICAL FITNESS

The ability of function effectively in physical work, training and other activities and still have enough energy left over to handle any emergencies which may arise. The ability of the body to meet present, future physical demands. The components of physical fitness are muscular strength, flexibility, muscular endurance, body composition and cardio-respiratory endurance.

CHAPTER II

REVIEW OF RELATED LITERATURE

A study of relevant literature is an essential step to get a full picture of what was done with regard to the problem under study. Such a review brings about a deep and clear perspective of the overall field.

Nowadays the educational program of any type is characterized by reform and innovative ideas. It seems to be necessary one to formulate such review of various scholars' work we can bring out a deep insight and clear perspective of the overall field in such reviews.

Such collected reforms have been presented in logical order, to in order to their importance and in sequence of merit.

📖 **Advan A, sanchez – Turet.M.**

They conducted a study on smoking effects on diurnal variations of cardiovascular parameters. The sample consisted of healthy subjects , 21 smokers and 21 non-smokers, from 18 to 26 yera. Smokers and non-smokers did not differ in diurnal levels of heart rate nor blood pressure when time of eday was not considered. However , when time of day was taken into account, , the groups differed significantly for heart rate and systolic blood pressure, while diastolic blood pressure only smokers. These data suggest that smoking habits in different sports should be considered when promoting physical activity as smoking prevention, and sports organizations should include smoking prevention programmers.

📖 **Altarac M, Gardner JW, Popovich RM, Potter R, Knapik JJ, Jones BH, 1993 August :25**

The Evaluated whether a recent history of cigarette smoking is a risk factor for exercise-related injuries during army basic training . 1087 male and 915 female were selected who underwent eight week basic military training . The reported that smoking at least one cigarette in the month prior to beginning basic training (which was conducted in a smoke free environment) had significantly higher injury rates during training than those who did not report smoking.

📖 **Conway TL Cronan TA,** Conducted a research on smoking , exercise, and physical fitness. They examined in 3 ,045 Navy personnel's in which exercise and smoking behaviors were measured using a life style survey and physical fitness were assessed using scores on the Navy's physical Readiness test. Analysis of Variance were conducted to examine the relationship among smoking status, exercise activity and PRT perfomance . They concluded that smoking is a detriment to physical fitness even among relatively young , fit individuals. Study finding suggest that smokers will have lower physical endurance both cardio-respiratory and muscular than non-smokers. Cigrette smokers should be given strong encouragement to stop smoking as part of any effort to improve physical fitness.

Smoking, Exercise and Physical fitness (1992, Nov:21).

📖 **David Pyne, an Australia sports physiologist (1997-2002).**

It is well-known fact that smoking reduces fitness. In a recent study adolescents who had smoked for five days had an 8 percent reduction in endurance time compared to controls, Individuals who smoke are less likely to

continue in exercise programs. The study found those who smoked under look less physical exercise sessions each work than non or ex-smokers. They also exercised less time per session. An US study found that smokers had higher levels of fatigue during both exercise and recovery.

Smoking and Fitness

🕮 From The Cleveland Clinic, Dept. of Patient Education and Health Information, Cleveland.

To achieve peak performance, your heart and lungs need oxygen rich blood, when you inhale tobacco smoke, you introduce carbon-monoxide combines with hemoglobin, a substance in the red blood cells that enables the blood to carry oxygen through the body, the ability to transport oxygen is reduced. As a result, less oxygen is delivered to your body's cells and to your heart and lungs. This decrease in oxygen will reduce the physical endurance and lead to shortness of breath almost three times as often as non-smokers. Young people who smoke experience the same negative effects of tobacco that adult smokers do.

Cardio-respiratory endurance and reduced muscular endurance. It is probably not surprising that smokers have been found to score as much as 22 points less than non-smokers on their physical fitness tests.

How smoking affects your physical activity?

🕮 From minister of Public Health and Govt. of Canada, 2003-02-10.

Smoking may be determent to physical fitness for all age groups. One recent study suggests that smokers have lower physical endurance than non-smokers, when difference in average exercise levels are taken into account.

🕮 **Fukuba Y.Takarnoto N,Kushima K, Ohtaki M, Kihara H, Tanaka T, Une S, Munuka M.(1993 July: 12).**

In this review, studies regarding the effects of cigarette smoking on parameters of physical fitness such as endurance performance, muscle strength etc., have been summarized with a special reference to the quality of life for middle aged and elder men, including the results of recent studies by the present authors. They are concluded mainly from our recent studies that, the smoking has an effect to impair the aerobic power, the smoking has a serious damage to several parameters of physical fitness.

🕮 **Kaup (June: 1994)** did a research on relations between physical fitness of college students and short-term smoking habits. His purpose of the study is to examine the effects of relatively short-term smoking habits. This paper deals with the analysis of the results of 1500m runs, step tests, FEV, percentage and Kaup index to determine the effects of smoking on cardio circulatory functions. The subjects were 5381 male. Physical fitness test and responded to the questionnaires were taken.

- ✓ The performance of 1500m runs was lower in smokers that non-smokers. Thus, the general endurance of smokers is considered to be inferior to that of non-smokers.

- ✓ Score of the step test was lower in smokers that non-smokers. This indicates that smoking habits could influence cardio-respiratory functions.

They concluded that short term smoking habits, even one-year length, may exert negative influences on influences on physical fitness such as general endurance.

🕮 Morton A R, Holmik E.V. (1985)

They did a research on the effects of cigarette smoking on maximal oxygen consumption and selected physiological responses were determined in seven well-trained non-smokers and seven well-trained habitual smokers. The acute effect of smoking two cigarettes immediately prior to a graded exercise stress test on a treadmill ergo meter did not significantly alter the Vo_2 of either group. However the time taken for the non-smokers to reach exhaustion decreased significantly. They concluded that smokers recorded lower scores for forced vital capacity and forced expiratory volume in the first exhalation than non-smokers. Only FVC of smokers recorded 5 min post exercise was significantly offered by pre-exercise smoking.

CHAPTER – III

METHODOLOGY

In this chapter, selection of subjects, variables, tests, the competency of these tests, the reliability regarding data, collection of data and the statistical test employed to analyze the data, etc, are described.

31. SELECTION OF SUBJECTS

To execute this investigation, the researcher employed random sampling method. Forty players were selected as subjects from football, cricket, hockey, basketball; volley ball disciplines who are studying at various institutions of Nandha, involved in sports activities, and among forty players twenty smokers and twenty non-smokers were taken. The age of subjects were ranged from 18 to 24 years.

3.2 SELECTION OF VARIABLES

Among the physical fitness components cardio-respiratory endurance of the players was selected as criterion variable.

3.3 REALIABILITY OF THE DATA

The reliability of the data was ensured by confirming the instrument’s reliability, tester’s competency, orientation of subjects.

3.3.1 INSTRUMENT RELIABILITY

The present study was undertaken to find out the significant differences if any, among smokers and non-smokers on cardio-respiratory endurance in college level sports-men. The investigator analyzed various literatures, has consulted the experts in physical education and sports, physical fitness and coaches and selected the test item which was a standardized and most suitable to serve the purpose of this study. The cardio-respiratory endurance was measured by conducting cooper's 12 minutes Run/walk test.

3.3.2 TESTER'S COMPETENCY

The researcher has learnt the procedure and method of administering the test. The researcher had a number of practice sessions in order to familiarize the testing procedure.

3.4 ORIENTATION OF THE SUBJECTS

The investigator explained the purpose of testing and also explained the procedures of the test and gave instructions which should be adopted by the subjects during / for measuring and the approval of the subject were gained.

3.5 ADMINISTRATION OF THE TEST AND DATA COLLECTION

For the purpose of the study the researcher followed the following procedure,

"Cooper's twelve minute run or walk test".

3.5.1 PURPOSE

The purpose of this test was to assess the cardio-respiratory endurance of the subjects.

3.5.2 FACILITIES AND EQUIPMENTS

The test was administered in 400 meters track. A stop watch calibration of 1/10 seconds, a whistle, score sheets and pencils were used to administer the test.

3.5.3 PROCEDURE

Cooper's twelve minute run or walk test was administered with the help of qualified testers. For this test, a 400 meters tract was prepared with marking at every tenth meter. The investigator and the testers served as the lap scores. The subjects were asked to stand on starting are drawn at the finish line on the 400 meters track and they were given instructions to cover as much as possible by running or walking. They were instructed to continue the run or walk till the final whistle. The test was started with a whistle to continue run/walk till the final whistle blown at the end of twelfth minute while performing the test, the number of minutes left was announced to the subjects

and informed to stop and stand instantly on that stop at the whistle of twelfth minute. The distances covered by each in twelve minutes were recorded to the nearest tenth meter. The distance covered by subjects was used a measure of cardio-respiratory endurance. Here, all the subjects were asked to run.

3.6 STATISTICAL TECHNIQUE

The purpose of this study was to find out the significant difference, if any among smokers and non-smokers on cardio-respiratory endurance in college level sports-men. The subjects were tested with standardized test and was analyzed statistically by using unpaired ‘t’ test to find out the significant difference among smokers and non-smokers on cardio-respiratory endurance.

$$\text{Unpaired t – test} = \frac{\left|\overline{X_1} - \overline{X_2}\right|}{\sigma\sqrt{1/n_1 + 1/n_2}}$$

CHAPTER – IV

RESULTS ADN DISCUSSION

4.1 OVERVIEW

This chapter deals with the analysis of data collected from the sample under study. The purpose of the study was to compare cardio-respiratory endurance among smokers and non-smokers in college level sports-men. The data was collected on forty subjects. For testing the significant difference among smokers and non-smokers statistical technique unpaired 't' ratio was used.

4.2 THE TEST OF SIGNIFICANT

This is the crucial position of the thesis in arriving at the conclusion, by examining the null hypothesis. The procedure of testing this statistical hypothesis was done either by accepting the null hypothesis or rejecting the same in accordance with the results obtained in relation to the level of confidence fixed by the researcher.

4.2.1 LEVEL OF SIGNIFICANCE

The probability level below which we reject the hypothesis in termed us the level of significance. The level of significance was set at 0.05 level of confidence which was considered adequate for the purpose of this study.

4.3 FINDINGS

The following table illustrates the statistical results of the variable.

TABLE 1

COMPUTATION OF UNPAIRED T-TEST VALUE AMONG SMOKERS AND NON-SMOKERS ON CARDIO – RESPIRATORY ENDURANCE

(SCORE IN METERS)

Subjects	Mean	Standard deviation	Obtained 't' ration
Smokers	2190	38.93	9.66
Non-smokers	2302	34.27	

Table value for 0.05 level = 2.021

Significant at 0.05 levels.

4.3.1 RESULTS OF CARDIO-RESPIRATORY ENDURANCE AMONG SMOKERS AND NON-SMOKERS

Table shows that the analyzed data on cardio-respiratory endurance level. The mean values of cardio-respiratory endurance on smokers and non-smokers were 2190 meters and 2302 meters respectively, by cooper's 12 minute run/walk test. The obtained t ratio of 9.66 was significant at 0.05 level for degrees of freedom of thirty eight.

4.3.2 DISCUSSION ON FINDINGS

The result indicated that the smokers had significant decrease on cardio-respiratory endurance when compared with non-smokers among college level sports-men.

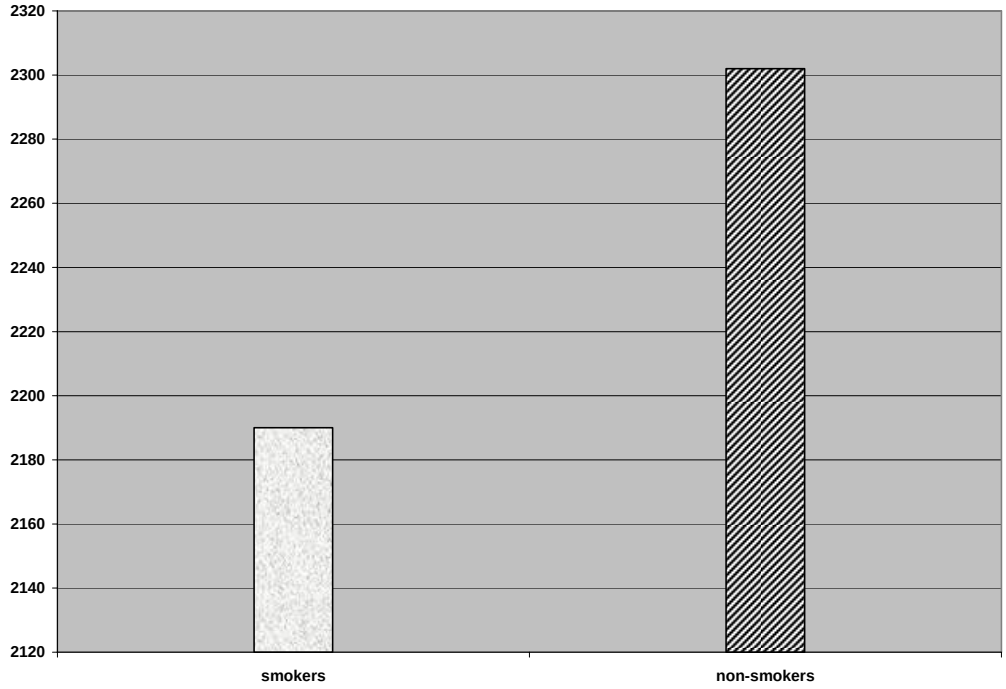
4.4 DISCUSSION ON HYPOTHESIS

In light of the preceding discussion and for the purpose of the present investigation, it was hypothesized singed that there would not be a significant decrease on cardio-respiratory endurance in smokers when compared with non-smokers among college level sports-men.

The findings of the study showed that there was significant decrease in cardio-respiratory endurance in smokers. Hence, the hypothesis is rejected on the above said variable.

THE MEAN VALUE OF SMOKERS AND NON-SMOKERS ON CARDIO RESPIRATORY ENDURANCE IS GRAPHICALLY SHOWN BELOW:

FIGURE 1



CHAPTER – V

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 SUMMARY

Human body is one of the most beautiful as well as the most complied one, where its proper care enables man to live the most and cherish the best.

"A HEALTHY AND FIT PERSON IS AN ASSET TO THE HUMANITY WHILE AN UNFIT INDIVIDUAL IS A CURSE ON HIM SELF AND AS WELL AS TO THE SOCIETY".

In the last few decades sports have gained tremendous popularity over the globe. The popularity of sports is increasing day by day at a fast pace, and is likely to be continued in future also.

Sports have become an important social and cultural activity in this modern world. It has deserved its own rightful place in the societies of the world.

Very few smokers acknowledge the fact that their life span is shortened by five and a half minutes for each cigarette. It has been proved that smoking has a deleterious effect on health which becomes the most prevalent form of drug dependence.

There are instance for the physiological changes that affect health because of smoking.

Smoking is a health hazard. Studies show smoking increases airway resistance and oxygen cost of breathing as three fold leaving less oxygen to be for other activities.

The smoke and nicotine has ill effect on the nervous system. The threefold mechanism involves carbon monoxide travels through the blood stream and attaches to the hemoglobin. This carbon monoxide blocks the oxygen in delivered to the working muscles .So a sportsman who is smoking has less oxygen for metabolism. So, fatigue sets in, endurance is lessened and sports men's performance is altered .

To facilitate the study 40 college level sports –men who are smokers and non –smokers are administered.

The were tested for cardio vascular endurance using cooper's 12 minutes run / walk test.

The levels of cardio-respiratory endurance were tested; their means were analyzed by t-radio through the independent t-test. The level of significance were set at 0.05 levels.

For cardio-respiratory endurance the resulted t-radio of 9.66 was significant at 0.05 levels for the degree of freedom thirty eight.

CONCLUSION

Within the limitations of the present study the following conclusions are drawn :

- There is significant decrease of cardio-respiratory endurance in the sports men who are smoking.

- The incidence of cramps, fatigue was reported more in smokers than in non-smokers.

5.3 RECOMMENDATIONS

Within the limitations of the study the following recommendations are made

- The same study may be conducted on different age groups and age group and sex.

- Similar study may be conducted with state level and national level players.

- Similar study may be conducted with different tritensities and durations .

- Same study may be under taken for chronic smokers.

- Same study may be conducted with some other physical and physiological variable.

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APPENDIX I

PERFORMA

DATE:

TIME:

NAME :

SEX :

ADDRESS :

CHEST NUMBER : _____

INVOLVED GAME OR SPORTS : _____

SMOKING HABIT : SMOKER / NON- SMOKER_____

SELECTION CRITERIA : INCLUSIVE / EXCLUSIVE _____

ENDURANCE TEST :

DISTANCE COVERED : _____

COMPLETE /INCOMPLETE : _____

PARTICIPANT'S SIGNATURE :_____

INVESTIGATOR'S SIGNATURE :_____

APPENDIX II

RAW SCORE OF THE CARDIO –RESPIRATORY ENDURANCES

FOR THE SMOKERS BY COOPER'S 12 MINUTE RUN TEST

S.No	Chest Number	$d\ x_1$	$\overline{d\ x_1}$	$x_1 - \overline{x_1}$	$(x_1 - \overline{x_1})^2$
1	007	2210	2190	20	400
2	020	2170	2190	-20	400
3	012	2230	2190	40	1600
4	001	2270	2190	80	6400
5	009	2170	2190	-20	400
6	004	2240	2190	50	2500
7	040	2150	2190	40	1600
8	036	2250	2190	60	3600
9	027	2200	2190	10	100
10	018	2190	2190	0	0
11	032	2130	2190	-60	3600
12	010	2130	2190	-60	3600
13	032	2180	2190	-10	100
14	019	2160	2190	-30	900
15	013	2160	2190	-30	900
16	024	2230	2190	40	1600
17	030	2160	2190	-30	900
18	039	2190	2190	0	0
19	028	2180	2190	-10	100
20	017	2200	2190	10	100

APPENDIX II

RAW SCORE OF THE CARDIO –RESPIRATORY ENDURANCES

FOR THE NON- SMOKERS BY COOPER'S 12 MINUTE RUN TEST

S.No	Chest Number	$d\ x_1$	$\overline{d\ x_1}$	$x_1 - \overline{x_1}$	$(x_1 - \overline{x_1})^2$
1	008	2330	2302	28	784
2	021	2290	2302	-12	144
3	003	2350	2302	48	2304
4	002	2370	2302	68	4624
5	006	2290	2302	-12	144
6	005	2340	2302	38	1444
7	038	2270	2302	-32	1024
8	037	2350	2302	48	2304
9	028	2320	2302	18	324
10	019	2290	2302	-12	14
11	033	2250	2302	-52	2704
12	011	2250	2302	-52	2704
13	031	2300	2302	-2	4
14	015	2260	2302	-42	1764
15	014	2280	2302	-22	484
16	025	2330	2302	28	784
17	034	2280	2302	-22	484
18	035	2290	2302	-12	144
19	029	2300	2302	-2	4
20	016	2300	2302	-2	4